

Amendments to the Specification:

Please amend the paragraph starting at page 1, line 16 and ending at page 1, line 24 to read, as follows.

In the two component type developing means, a mixing ratio between the toner and the carrier is changed with consumption of the toner. With the change in mixing ratio, a change in image density and toner scattering are caused to occur. For this reason, the mixing ratio has been measured [[by]] using an optical means etc. On the basis of this measurement result, the mixing ratio has been retained to stabilize the image density.

Please amend the paragraph starting at page 2, line 4 and ending at page 2, line 13 to read, as follows.

Thus, such a method that an electrostatic latent image is formed on an image bearing member, developed under predetermined conditions, and subjected to measurement of image density to adjust a mixing ratio between the toner and a carrier, has been used. By such a method, the above mentioned problem such that a resultant image density is not stabilized due to degradation of the carrier and a charge amount of the toner changed depending on an environment of the image forming apparatus used, has been solved.

Please amend the paragraph starting at page 5, line 19 and ending at page 5, line 21 to read, as follows.

Figure 10 is a flowchart ~~flow chart~~ of developing voltage correction in Embodiment 1 appearing hereinafter.

Please amend the paragraphs starting at page 6, line 3 and ending at page 6, line 6 to read, as follows.

Figure 13 is a flowchart ~~flow chart~~ of developing voltage correction in Embodiment 2.

Figure 14 is a flowchart ~~flow chart~~ of developing voltage correction in Embodiment 3.

Please amend the paragraphs starting at page 7, line 19 and ending at page 9, line 10 to read, as follows.

Referring to Figure 1, the image forming apparatus includes a drum-type electrophotographic photosensitive member as an image bearing member (hereinafter, referred to as a “photosensitive drum”) 1. The photosensitive drum 1 is supported rotatably in a direction of an arrow R1. Around the photosensitive drum 1, a primary charger (charging means) 2, an exposure apparatus (exposure means ~~means~~ 3, a developing apparatus (developing means) 4, an intermediary transfer belt 5, and a cleaning apparatus (cleaning means) 6 are disposed substantially in this order from an upstream side along the rotational direction of the photosensitive drum 1. Further, below the intermediary transfer 5, a transfer conveyance belt 7 is disposed. On a downstream side along a conveyance direction of a recording material P (indicated by an arrow), ~~arrow A~~); a fixing apparatus (fixing means) 8 is disposed.

In this embodiment, as the photosensitive drum 1, a drum having a diameter of 60 mm is used. The photosensitive drum 1 is, as shown in Figure 3, prepared by forming a photosensitive layer 1b of an ordinary organic photoconductor (OPC) through coating onto

an outer peripheral surface of an electroconductive drum support 1a of aluminum which is grounded, and forming thereon a protective layer (~~over coat layer: OCL~~) (overcoat layer: OCL) 1c excellent in durability through coating. Of these layers, the photosensitive layer 1b is constituted by four layers including an undercoating layer (conductive pigment layer: CPL) 1b1, an injection prevention layer (undercoat layer: UCL) (~~under coat layer: UCL~~) 1b2, a charge generation layer (CGL) 1b3, and a charge transport layer (CTL) 1b4. The photosensitive layer 1b is ordinarily an insulating member and has a property of being changed to an electroconductive member by irradiating it with light of a specific wavelength. This is because holes (electron pair) are generated in the charge generation layer 1b and function as an electron charge carrier. The charge generation layer 1b is a 0.2 μm -thick layer of a phthalocyanine compound, and the charge transport layer 1c is a ca. 2.5 μm -thick layer of polycarbonate in which a hydrazine ~~hydrazone~~ compound is dispersed. The photosensitive drum 1 is rotationally driven in a direction of an arrow R1 at a predetermined process speed (peripheral speed) by a drive means (not shown).

Please amend the paragraphs starting at page 9, line 16 and ending at page 11, line 7 to read, as follows.

In this embodiment, a laser scanner effecting ON/OFF action of laser light depending on image information is used as the exposure apparatus 3. The surface of the photosensitive drum 1 after being charged is irradiated with the laser light generated by the exposure apparatus 3 via a reflection mirror 3a, ~~mirror~~, whereby electric charges at the laser irradiation portion are removed so as to allow formation of an electrostatic latent image.

In this embodiment, the developing apparatus 4 employs a rotation development scheme. The developing apparatus 4 includes a rotating member 4A ~~rotationally~~ ~~rotationally~~ driven about an axis (shaft) 4a in a direction of an arrow R4 by a motor (not shown) and four developing devices of black (4K), yellow (4Y), magenta (4M) and cyan (4C) ~~incorporated~~ ~~in incorporated~~ in the rotating member 4A. When a black developer image (toner image) is formed on the photosensitive drum 1, development is performed at a developing position DP ~~[[D]]~~ closer to the photosensitive drum 1 by the black developing device 4K. Similarly, when a yellow toner image is formed, the rotating member 4A is rotated 90 degrees to locate the yellow developing device 4Y at the developing position DP ~~[[D]]~~ to effect development. Formation of a magenta toner image and a cyan toner image is performed in a similar manner. In the following description, the developing devices 4K, 4Y, 4M and 4C are simply referred to as a “developing device” unless their colors are specified particularly.

The ~~above-mentioned~~ ~~above mentioned~~ intermediary transfer belt 5 is extended around a drive roller 10, a primary transfer roller (primary transfer charger) 11, a driven (follower) roller 12, and a secondary transfer opposite roller 13, and is rotated in a direction of an arrow R5 by rotation of the drive roller 10. A belt cleaner 14 abuts against the intermediary transfer belt 5. The above-described transfer conveyance belt 7 is extended around a drive roller 15, a secondary transfer roller 16 and a driven (follower) roller 17, and is rotated in a direction of an arrow R7 ~~[[7]]~~ by rotation of the drive roller 15. The described ~~fixing apparatus~~ ~~transfer roller~~ 8 includes a fixation roller 18 containing therein a heater (not shown), and a pressure roller 20 to be disposed in abutment with the fixation roller from below.

Please amend the paragraphs starting at page 11, line 23 and ending at page 12, line 20 to read, as follows.

In the case of effecting four color-based full color image formation, first of all, a black toner image is formed on the photosensitive drum 1 by the black developing device 4K and primary-transferred onto the intermediary transfer belt 5. Toner (residual toner) remaining on the photosensitive drum 1 surface after the primary transfer is removed by being scraped by an elastic blade provided to the cleaning apparatus 6. Then, the rotation member 4A ~~[[1A]]~~ is rotated 90 degrees, the yellow developing device 4Y is located in the developing position D, and a yellow toner image is formed on the photosensitive drum 1 and primary-transferred and superposed on the black toner image transferred onto the intermediary transfer belt 5.

This operation is successively effected also with respect to the magenta developing device 4M and the cyan developing device 4C, thus superposing four color toner images on the intermediary transfer belt 5. Thereafter, by applying a secondary transfer roller 16, the four color toner images disposed on the intermediary transfer belt 5 are ~~[[ar]]~~ secondary-transferred onto a recording material P held on the transfer conveyer belt 7 at the same time.

Please amend the paragraph starting at page 14, line 20 and ending at page 15, line 5 to read, as follows.

Inside of the developing sleeve 24, a fixed magnet 25 as magnetic field generation means is disposed. The developing sleeve 24 is formed of a non-magnetic material and rotated in a direction of an arrow R24 ~~[[24]]~~ shown in Figure 4, i.e., a gravitational

direction (downward direction) in the developing area, whereby the two component type developer in the developer container 22 constituting the developing device is held in a laminar shape and carried to the developing area. As a result the developer is supplied to the developing position D opposite to the photosensitive drum 1 to develop the electrostatic latent image formed on the photosensitive drum 1.

Please amend the paragraph starting at page 16, line 3 and ending at page 16, line 24 to read, as follows.

With respect to the above-mentioned developer, the toner component therein is consumed with an increase in the number of sheet of image formation (copying). An amount of toner corresponding to that of the consumed toner is supplied from a developer replenishing port 22a to the developer container 22 disposed at the developer container 22 via a developer replenishing port 23a and a replenishing conveyance passage 28. The replenished toner is supplied toward stream in the developer conveyance direction container 22, and is mixed under stirring with the developer already present in the developer container 22 and the developer after development conveyed by the first circulation screw 27a. The resultant developer is conveyed to the first circulation screw 27a in a well-stirred ~~well-stirred~~ state and then is supplied again to the developing sleeve 24. A replenishing screw 30 (toner replenishing means) is provided in the replenishing conveyance passage 28 and its rotation time is controlled a CPU 29 to adjust a toner amount to be supplied to the developing device.

Please amend the paragraphs starting at page 20, line 11 and ending at page 21, line 16 to read, as follows.

Incidentally, in this embodiment, a latent image formed through digital exposure is hereinafter referred to as a digital latent image, and an image formed by developing the digital latent image, and an image formed by developing the digital latent image is referred to a digital image. In order to distinguish images, in the case of forming a patch image without using the above-described ~~above-described~~ laser exposure, from the digital latent image and the digital image, a latent image formed without using the laser exposure is referred to as an analog latent image, and an image formed by developing the analog latent image is referred to as an analog image.

However, in the case where the above-described ~~above-described~~ digital patch image scheme is employed, a characteristic of the photosensitive drum 1, particularly a photosensitivity characteristic is changed, in some cases, due to deterioration by use of the photosensitive drum 1 and environmental change thereof, when compared with that at an initial stage. For this reason, an electric potential obtained by exposing the photosensitive drum 1 through laser output of the exposure apparatus 3 and an electric potential to be obtained at the initial stage cause a difference therebetween. As a result, an image density of an image formed on the photosensitive drum 1 is deviated from a desired value by the potential difference. If the image density including this error is used for controlling the amount of replenishment toner, the toner content in the developing device is outside the range of a desired value. Accordingly, there is a possibility that a change in image density and toner fog are caused to occur to result in image failure.

Please amend the paragraph starting at page 23, line 26 and ending at page 24, line 12 to read, as follows.

An electrostatic latent image for an ordinary image to be formed in an image area C on the photosensitive drum 1 is formed as a digital latent image. When the digital latent image reaches the developing position opposite to the developing device, the digital latent image is developed by applying the developing bias voltage A shown in Figure 7(a) from the high-voltage power source to the developing sleeve of the developing device. In a period until an electrostatic latent image for a subsequent ordinary image, there is a non-image area E. ~~In the non-image area E.~~ In the non-image area E, control of toner replenishment is effected by forming a patch image for toner replenishment.

Please amend the paragraph starting at page 26, line 8 and ending at page 27, line 7 to read, as follows.

On the other hand, the developing bias voltage B shown in Figure 7(b) is a rectangular pulse bias voltage which repetitively has an alternating portion where an alternating electric field is created by applying a voltage of DC voltage biased with an AC voltage to the developing sleeve 24. By using such a developing bias voltage B as shown in Figure 8(b), it is ~~is~~ possible to realize such a developing characteristic that the toner content in the developing device is faithfully reflected in the image density of the toner image formed (developed). In Figure 8(b), a curved ~~curve of~~ solid line represents an ideal image density curve and curved ~~curves of~~ broken lines represent image density curves when the toner content in the developing device is changed. In other words, an amount of change in toner content in the developing device is sensitively reflected in an amount of

change in image density of the resultant toner image, so that the developing bias voltage B is suitable for the case of controlling the toner content, thus being liable to reduce the load on the developer. As a result, it is possible to suppress deterioration of the toner and the carrier. Further, it is also possible to alleviate the change in toner content by the change in thickness of the surface layer of the photosensitive drum since the resultant toner image density is sensitively changed by the toner content.

Please amend the paragraph starting at page 28, line 16 and ending at page 29, line 6 to read, as follows.

The carrier may, e.g., be suitably comprised of particles of surface-oxidized or non-oxidized metals such as iron, nickel, cobalt, manganese, chromium and rare-earth elements; their alloys and oxides; and ferrite. These magnetic particles may be produced through any process. The carrier has a weight-average particle size of 20 - 50 μm , preferably 30 - 50 μm , and a volume resistivity of not less than 10^7 ohm.cm, preferably not less than 10^8 ohm.cm. In this embodiment, the carrier has a volume resistivity of not less than 10^8 ohm.cm. The carrier is a low specific gravity carrier which comprises a resinous magnetic carrier produced through a polymerization process after a phenolic resin binder, a magnetic metal oxide, and a non-magnetic metal oxide are mixed in a predetermined ratio. The carrier has a volume-average particle size of 35 μm , a true density of 3.6 - 3.7 g/cm³, and a magnetization of 53 A·m²/kg.

Please amend the paragraph starting at page 29, line 10 and ending at page 30, line 5 to read, as follows.

Coulter Counter counter “Model TA-II” (available from Coulter Electronics Inc.) and an interface (available from Nikkaki K.K.) and a personal computer (Model “CX-1”, available from Canon K.K.) for outputting number- and volume-average particle size distributions are used as measuring apparatuses. A 1 %-NaCl aqueous solution is prepared as an electrolytic solution by using a reagent-grade sodium chloride. For the measurement, 0.1 ml of a surfactant, preferably a solution of an alkylbenzenesulfonic acid salt, is added as a dispersant into 100 to 150 ml of the electrolytic solution, and 0.5 - 50 mg of sample toner particles (or a sample toner) are added thereto. The resultant dispersion of the sample in the electrolytic solution is subjected to a dispersion treatment for ca. 1 - 3 minutes by means of an ultrasonic disperser, and then subjected to measurement of particle size distribution in the range of 2 - 40 μm by using the above-mentioned apparatus (Coulter counter TA-II) with a 100 μm -aperture to obtain a volume-basis distribution and a number-basis distribution. From the volume-basis distribution, a volume-average particle size is calculated.

Please amend the paragraph starting at page 30, line 8 and ending at page 30, line 14 to read, as follows.

By using a sandwich-type ~~sandwich-type~~ cell including a pair of measuring electrodes (electrode area: 4 cm^2 , spacing therebetween: 0.4 cm), a voltage E (V/cm) is applied between the electrodes under application of a load of 1 kg on one of the electrodes. A volume resistivity is determined from a current passing through the circuit at that time.

Please amend the paragraphs starting at page 31, line 10 and ending at page 31, line 24 to read, as follows.

First, referring to Figure 10, thickness values CT_2 to CT_7 when the patch contrast correction is performed are determined and converted into current values based on the above-described current value-surface layer thickness table (Figure 5). The ~~[[The]]~~ resultant current values (of photosensitive drum) IDC_2 to IDC_7 are used as threshold values for correction timing.

At the time of an initial setting of the image forming apparatus or replacement of photosensitive drum, the above-described thickness detection sequence is continuously effected three times, and an average current (IDC_1) of three detection results is taken as ~~[[a]]~~ an initial current value of the photosensitive drum.

Please amend the paragraph starting at page 33, line 3 and ending at page 33, line 11 to read, as follows.

After completion of the above-described ~~above~~ patch contrast correction, in subsequent use of the image forming apparatus, the latest 3 detection results of the surface layer thickness detection sequence are stored, and when an average value IDC_B of these 3 detection results satisfies $IDC_B \geq IDC_3$, the toner patch developing potential Vpdc_2 is corrected to a predetermined value (-10 V in this embodiment) to obtain Vpdc_3.

Please amend the paragraphs starting at page 34, line 15 and ending at page 35, line 2 to read, as follows.

On the other hand, the results of the image formation in which the patch contrast correction is effected are shown in Figure 12. Referring to Figure 12, the initial toner content of 7 % was not substantially lowered even when abrasion of the photosensitive drum surface layer proceeded, and was 6.5 % after 30000 ~~[[3000]]~~ sheets of image formation.

As described above, even when the thickness of the surface layer of the photosensitive drum 1 is changed, the surface layer thickness of the photosensitive drum 1 is accurately detected and based on the detected results, the toner is supplied from the toner container 23 into the developing device 22, so that it is possible to always effect ~~always~~ stable image formation without changing the toner content.

Please amend the paragraph starting at page 36, line 23 and ending at page 37, line 3 to read, as follows.

More specifically, referring to Figure 13, ~~[[12,]]~~ similarly as Embodiment 1, the surface layer thickness detection sequence is continuously effected three times at the time of initial setting of the image forming apparatus or replacement of the photosensitive drum 1, and an average current (IDC_1) of three detection results is taken as ~~[[a]]~~ an initial current value of the photosensitive drum.